

# Algebra 1

## Domaci' cvičení' 9

$$81. (2+i)i + \frac{3+i}{2-i} = 2i-1 + \frac{3+i}{2-i} \cdot \frac{2+i}{2+i} = 2i-1 + \frac{6+5i-1}{4+1} =$$
$$= 2i-1 + \frac{5i+5}{5} = 2i-1+i+1 = \underline{\underline{3i}}$$

$$82. z = 10 - 10i$$

$$|z| = \sqrt{100+100} = 10\sqrt{2}$$

$$\left. \begin{array}{l} \cos \alpha = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \\ \sin \alpha = \frac{-1}{\sqrt{2}} = \frac{-\sqrt{2}}{2} \end{array} \right\} \begin{array}{l} \alpha_0 = \frac{\pi}{4}, \text{ IV. kvadrant} \\ \alpha = \frac{7}{4}\pi \end{array}$$

$$\underline{\underline{z = 10\sqrt{2} \cdot (\cos \frac{7}{4}\pi + i \sin \frac{7}{4}\pi)}}$$

$$83. \frac{-1+2i}{1+3i} \cdot \frac{1-3i}{1-3i} = \frac{-1+5i+6}{1+9} = \frac{5+5i}{10} = \frac{1}{2} + \frac{1}{2}i$$

$$z = \frac{1}{2} + \frac{1}{2}i$$

$$|z| = \sqrt{\frac{1}{4} + \frac{1}{4}} = \sqrt{\frac{1}{2}} = \frac{\sqrt{2}}{2}$$

$$\left. \begin{array}{l} \cos \alpha = \frac{\frac{1}{2}}{\frac{\sqrt{2}}{2}} = \frac{\sqrt{2}}{2} \\ \sin \alpha = \frac{\frac{1}{2}}{\frac{\sqrt{2}}{2}} = \frac{\sqrt{2}}{2} \end{array} \right\} \begin{array}{l} \text{I. kvadrant, } \alpha = \frac{\pi}{4} \end{array}$$

$$\underline{\underline{z = \frac{\sqrt{2}}{2} (\cos \frac{\pi}{4} + i \sin \frac{\pi}{4})}}$$

$$84. (1 - i\sqrt{3})^5$$

$$z = 1 - i\sqrt{3}$$

$$|z| = \sqrt{1+3} = 2$$

$$\left. \begin{array}{l} \cos \alpha = \frac{1}{2} \\ \sin \alpha = \frac{-\sqrt{3}}{2} \end{array} \right\} \alpha_0 = \frac{\pi}{3}, \text{ IV. kvadrant}$$
$$\alpha = 2\pi - \frac{\pi}{3} = \frac{5}{3}\pi$$

$$z = 2 \cdot \left( \cos \frac{5}{3}\pi + i \sin \frac{5}{3}\pi \right)$$

$$z^5 = 2^5 \cdot \left( \cos \frac{25}{3}\pi + i \sin \frac{25}{3}\pi \right) = 32 \cdot \left( \cos \frac{\pi}{3} + i \sin \frac{\pi}{3} \right) =$$

$$= 32 \cdot \left( \frac{1}{2} + i \frac{\sqrt{3}}{2} \right) = \underline{\underline{16 + 16\sqrt{3}i}}$$